



**Upper Stage Manufacturing and Assembly:** The Ares I Upper Stage Element successfully conducted a friction stir weld of two Space Shuttle External Tank (ET) dome gores on August 11 in Marshall Space Flight Center (MSFC) Building 4755. In this test, workers from the EM30/Metal Materials Branch demonstrated future Ares I upper stage friction stir welding tasks by welding the Aluminum-Lithium (Al-Li) ET dome gores together using Marshall's Robotic Weld Tool (RWT). This first in a series of tests on complex curvature welds will lay the groundwork for future work on the Ares I upper stage.

The RWT, the largest welder of its kind in the United States, will be used to develop the manufacturing techniques required to fabricate the tanks of the Ares I upper stage. The tool is critical for manufacturing the Main Propulsion Test Article, which will demonstrate the functionality of the upper stage. Friction stir welding transforms the Al-Li alloy from a solid state into a "plastic-like" state, and then methodically stirs the materials together under pressure to form a welded joint.



*Ares I and Upper Stage managers with ET Dome Gore Welding team*

*Recent activities specific to the Elements include:*

- **Flight and Integrated Test Office (FITO) and Ares I-X**

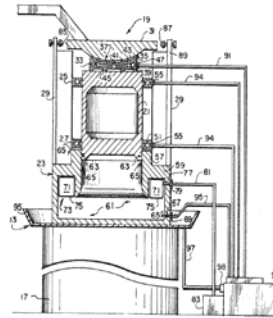
**Ares I-X Roll Control System (RoCS) Element:** The Ares I-X Control Board (XCB) approved the change to the RoCS initiation from after T=0 to T=0 and T+0.040 (primary/secondary). Helium pressurant tube welding has started at Teledyne. RoCS participated in RoCS/Upper Stage/Ground Operations installation/fit check roles and



responsibilities planning meeting #2. This activity is finalized now as a precursor to going to the Schedule Summit next week at Kennedy Space Center (KSC). Pratt and Whitney Rocketdyne (PWR) personnel came to Teledyne to perform propellant tank cap weld equipment fit checks and process development. Post-phase III ordnance components from Ensign-Bickford were received at Teledyne. This completes all ordnance deliveries.

- **Integrated Vehicle Ground Vibration Test (IVGVT): Hydrodynamic Support (HDS) System Being Prepared for Modal Testing:**

George Landwehr von Pragenau, who conceived the HDS concept for the Saturn V testing, has been brought on contract to work with the Ares I IVGVT team to help bring the HDS system back online to support the human rating of a third NASA vehicle. He holds the patent for the HDS design. A quote from the patent states, "Other objects, uses, and advantages of the present invention will become apparent as the description proceeds." Thirty years after their final use on Shuttle, the HDS units have been refurbished and are currently undergoing testing in preparation for their use in the modal testing (IVGVT) of the full-scale Ares I Test Article at MSFC.



*Patent drawing of HDS system*



*Actual HDS*

- **First Stage (FS)**

- **Hot Gas Testing of Thermal Protection System (TPS) Materials for Ares I First Stage Environments:** The predicted Ares I FS re-entry environments are well above the current Solid Rocket Booster (SRB)/Reusable Solid Rocket Motor (RSRM) thermal environments to which the TPS materials have been characterized. Testing at higher heat rates is required to extend the material characterization levels and to show recession trends to get more confidence for extrapolation. Two samples each of the seven materials: Marshall Convergent Coating -1 (MCC-1), Booster Trowelable Ablative (BTA), USA sheet cork, ATK sheet cork, RT455, Silica Filled EPDM (SFEPDM), and Froth-Pak foam at 15 Btu/ft<sup>2</sup>-sec were tested to establish a tie to the historical data for these materials. All materials appeared to perform as expected with the exception of the ATK cork and SFEPDM. It is uncertain if the design curves for these materials were actually exceeded until the test panels have been scraped and final thickness measurements have been performed. The ATK cork panel testing has been put on hold until new panels can be built with a new lot of cork. Testing of the other TPS materials is continuing at peak enthalpy conditions and an average heat rate of 20+ Btu/ft<sup>2</sup>-sec.



- **Deceleration Subsystem (DSS) Post-Drop Test Technical Interchange Meeting (TIM):** A TIM was conducted this week at KSC to evaluate the drogue chute damage from its first drop test (DDT-1) and to establish corrective action. A tear of 20 ribbons in a single gore in the upper portion of the canopy was attributed to vent dynamics during deployment. The video showed excessive line sail which induces a whip effect in the canopy as it is deployed. The vent hoop at the top is the end of the whip and, as it snapped over, contacted the upper canopy. The combination of force and friction abrasion produced the canopy tear at the impact area. This tear of approximately 40 inches did not propagate as the canopy inflated. Line sail will be mitigated by adding additional and stronger bag line ties to reduce line slack during deployment. Additional ripstops will also be added in the upper canopy to help mitigate propagation if a ribbon tear does occur from vent dynamics.
  
- **Project Integration (PI)**
  - **Ares Outreach:** The Ares Projects integration team presented the Constellation/Ares story to a group of 25 Huntsville-area middle and high school teachers at the NASA Educator Resource Center as part of a Professional Development Institute-sponsored event on August 5. The team also supported a presentation by the Deputy Manager of the Ares I-X Mission Management Office (MMO) to 18 teachers attending Space Camp on August 7.
  
- **ESPN Summer X Games:** The Ares Projects integration team provided Ares exhibits and staffed the display for a NASA Headquarters Exploration Systems Mission Directorate (ESMD) tent at the ESPN Summer X Games. Exhibits included the 1:50 Ares I and Ares V model set and the smaller version of the Interactive Constellation Experience exhibit. More than 8,000 people visited the NASA tent.



*Deputy Manager, Ares I-X MMO, talks to Space Camp teachers*

The Ares Project looks forward to the kick-off of the Upper Stage Engine Critical Design Review (CDR) and the Ares I PDR Pre-Board and Board in September.

***...and as of this Ares Projects Weekly Summary, there are only 243 days until the first Ares I test flight, Ares I-X!!!***